

Fig. 1

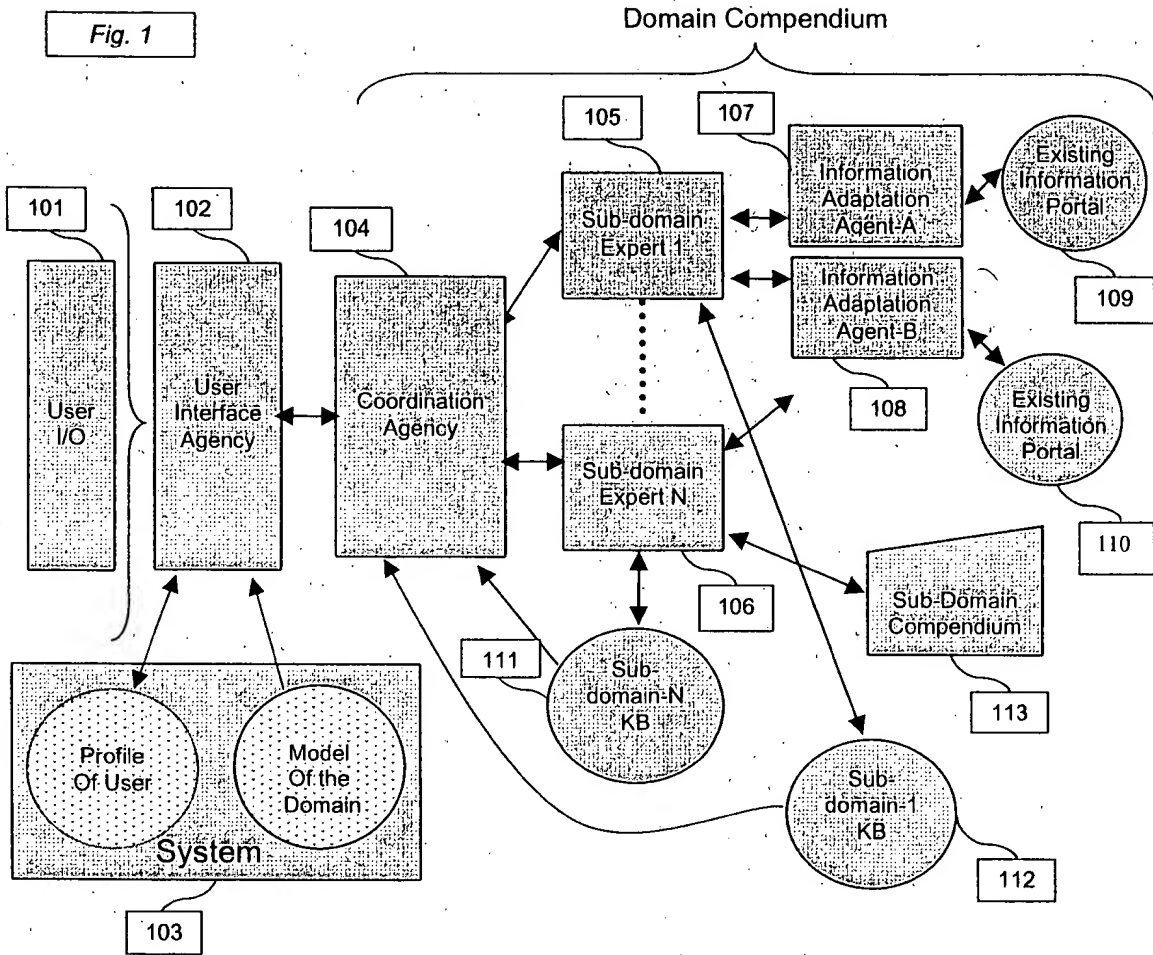


Fig. 2

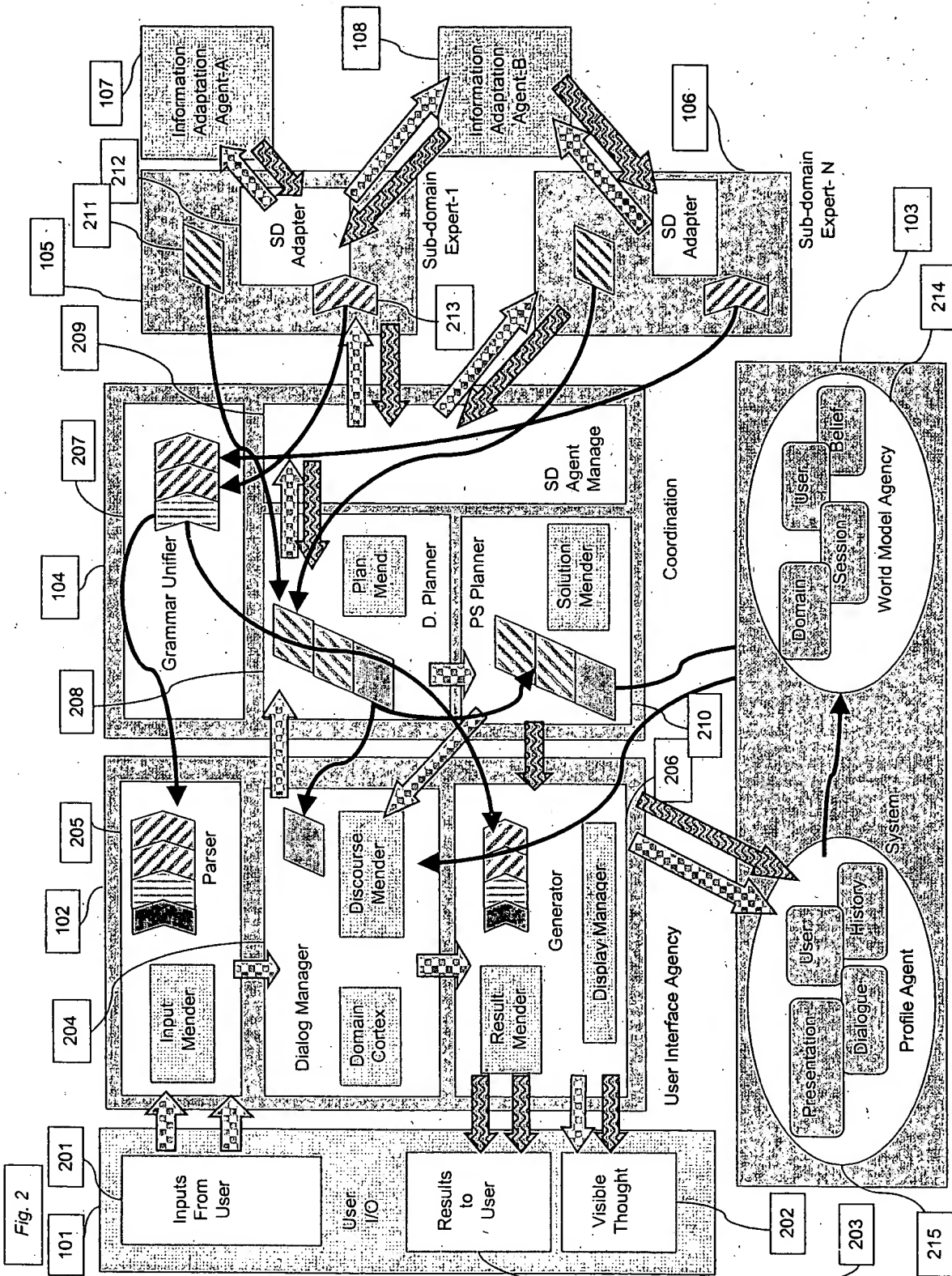


Fig. 3

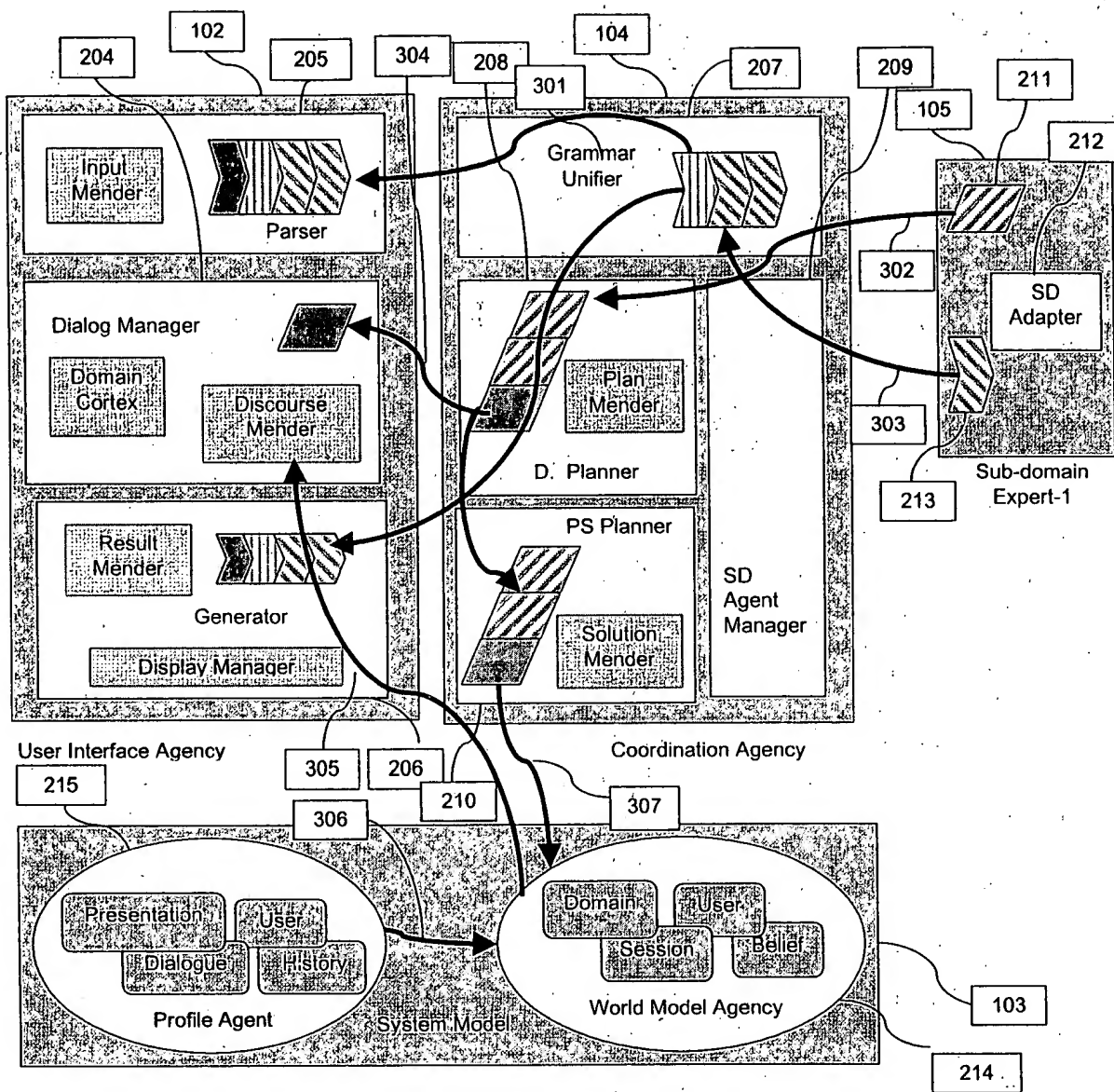


Fig. 4

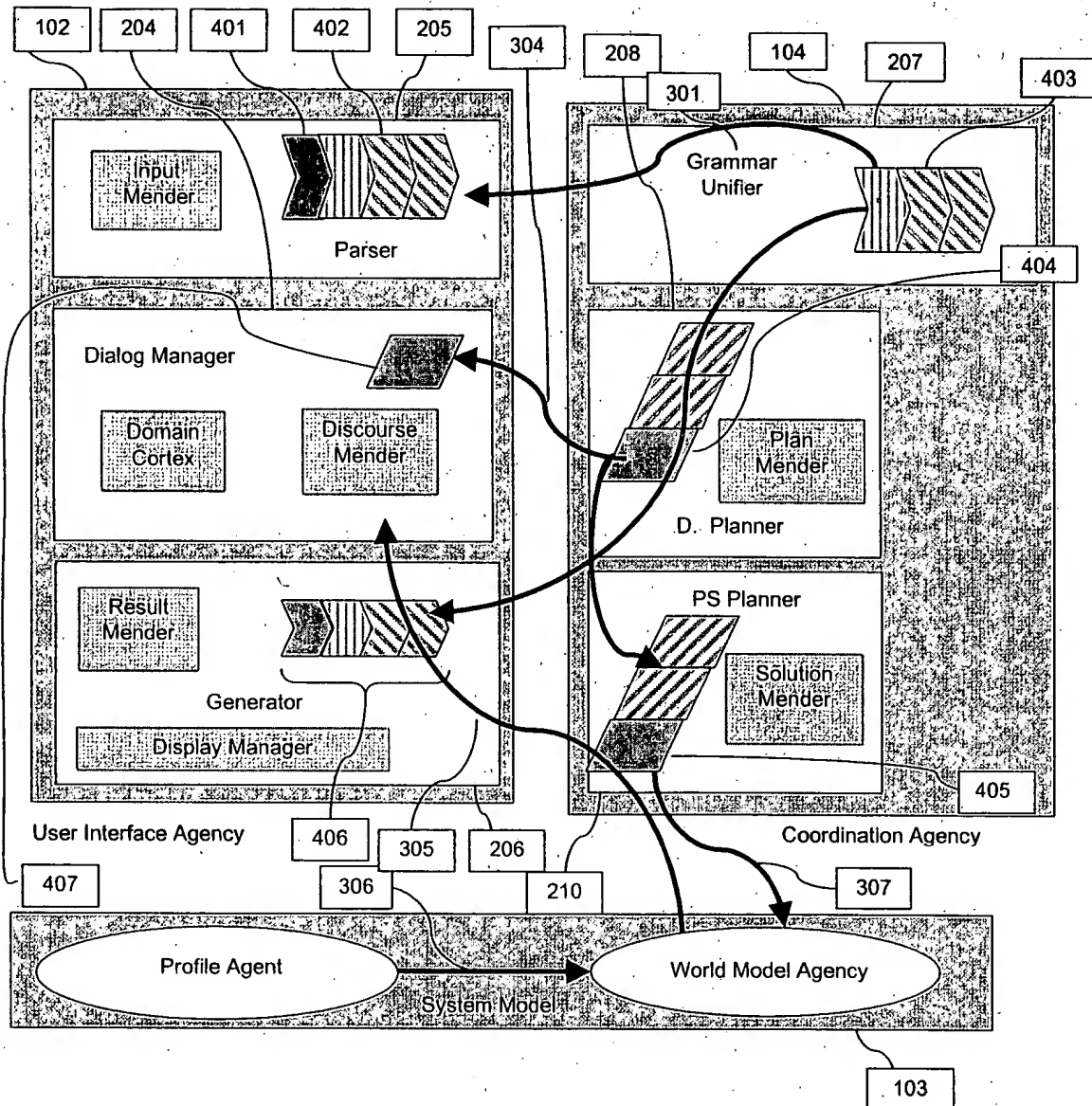


Fig. 5

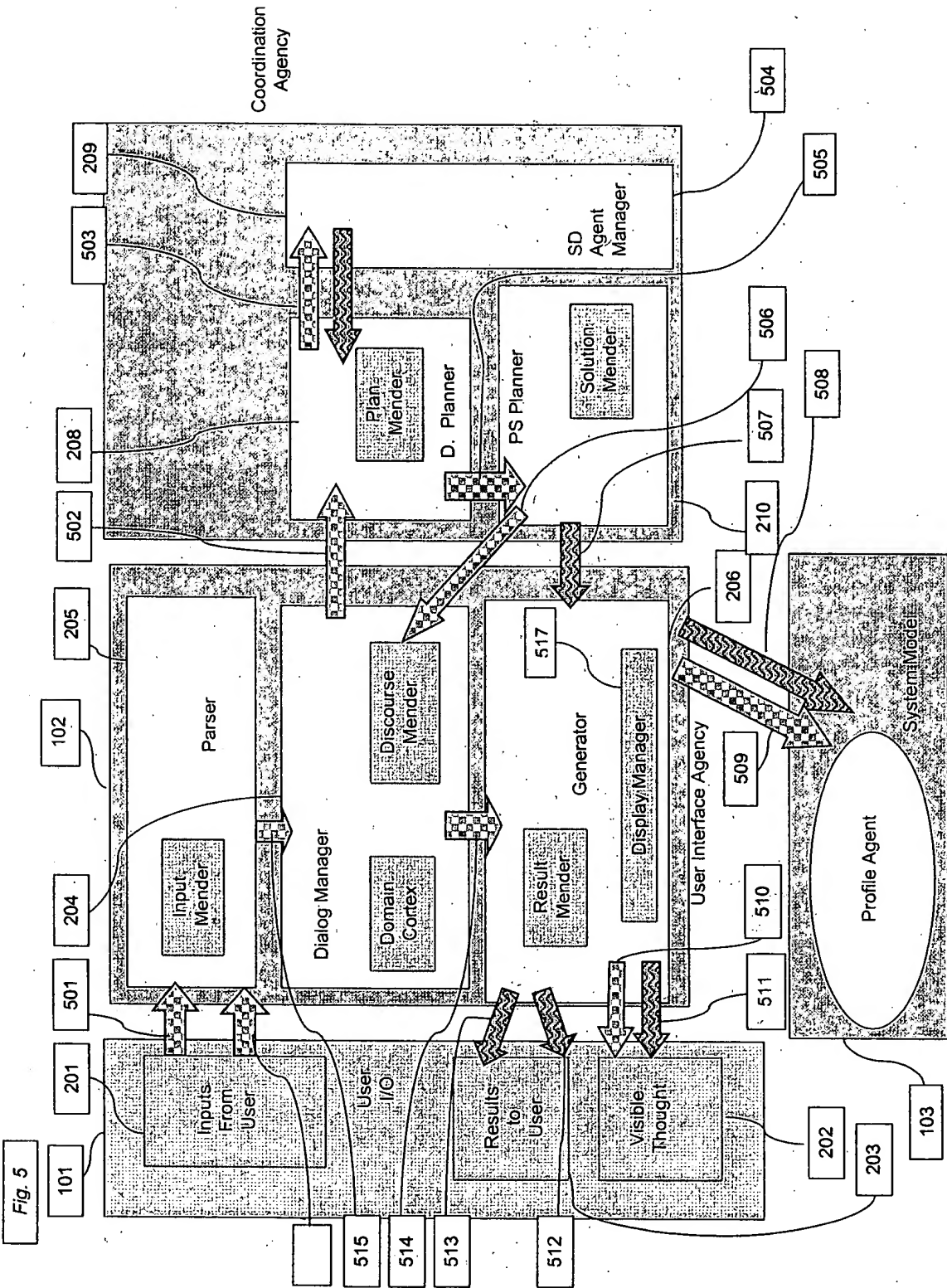


Fig. 6

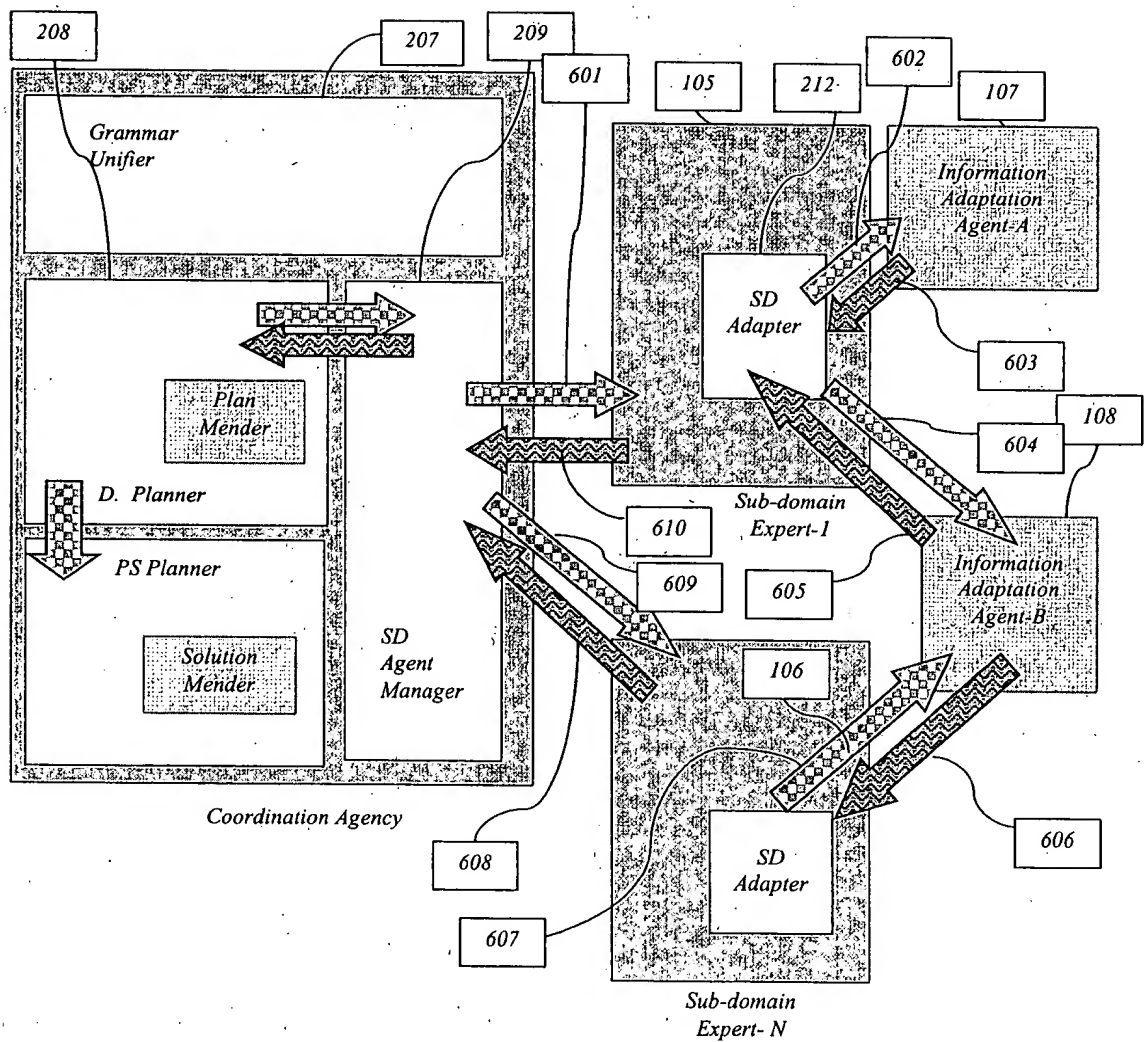


Fig. 7

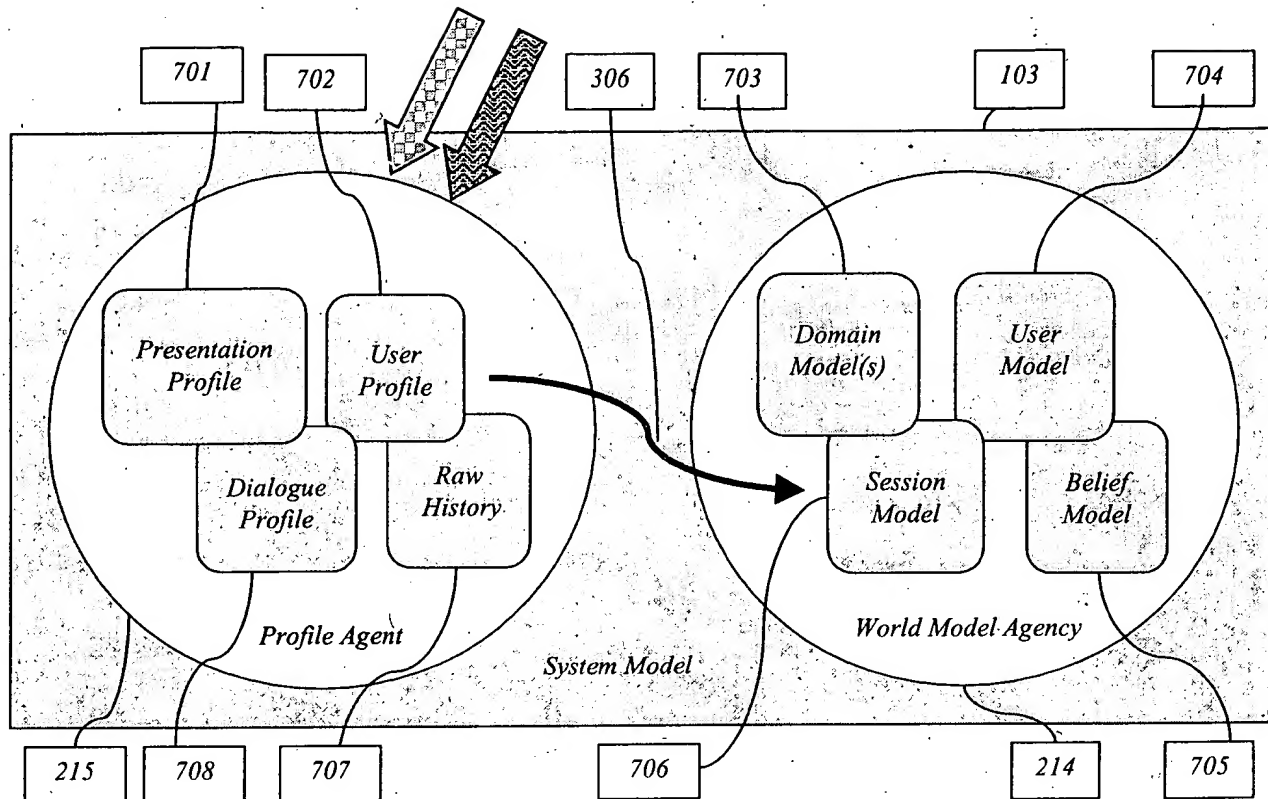


Fig. 8

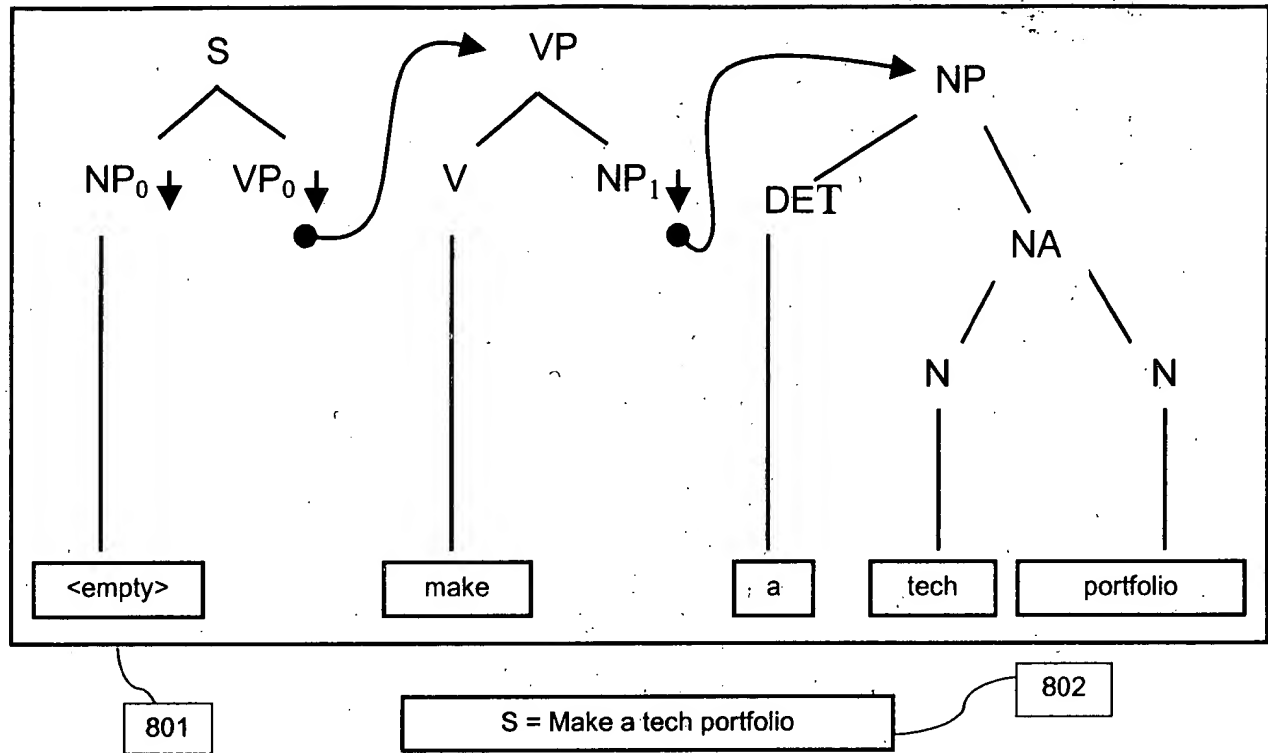


Fig. 9

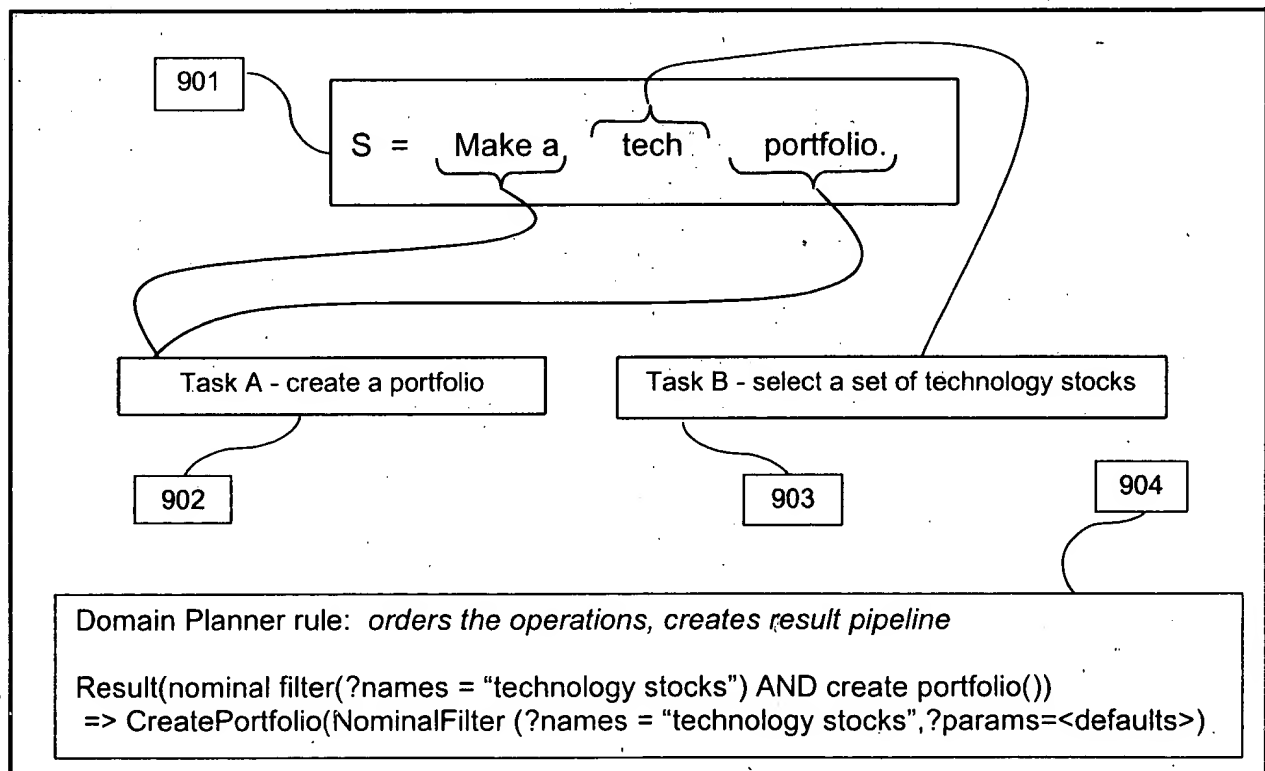




Fig. 10

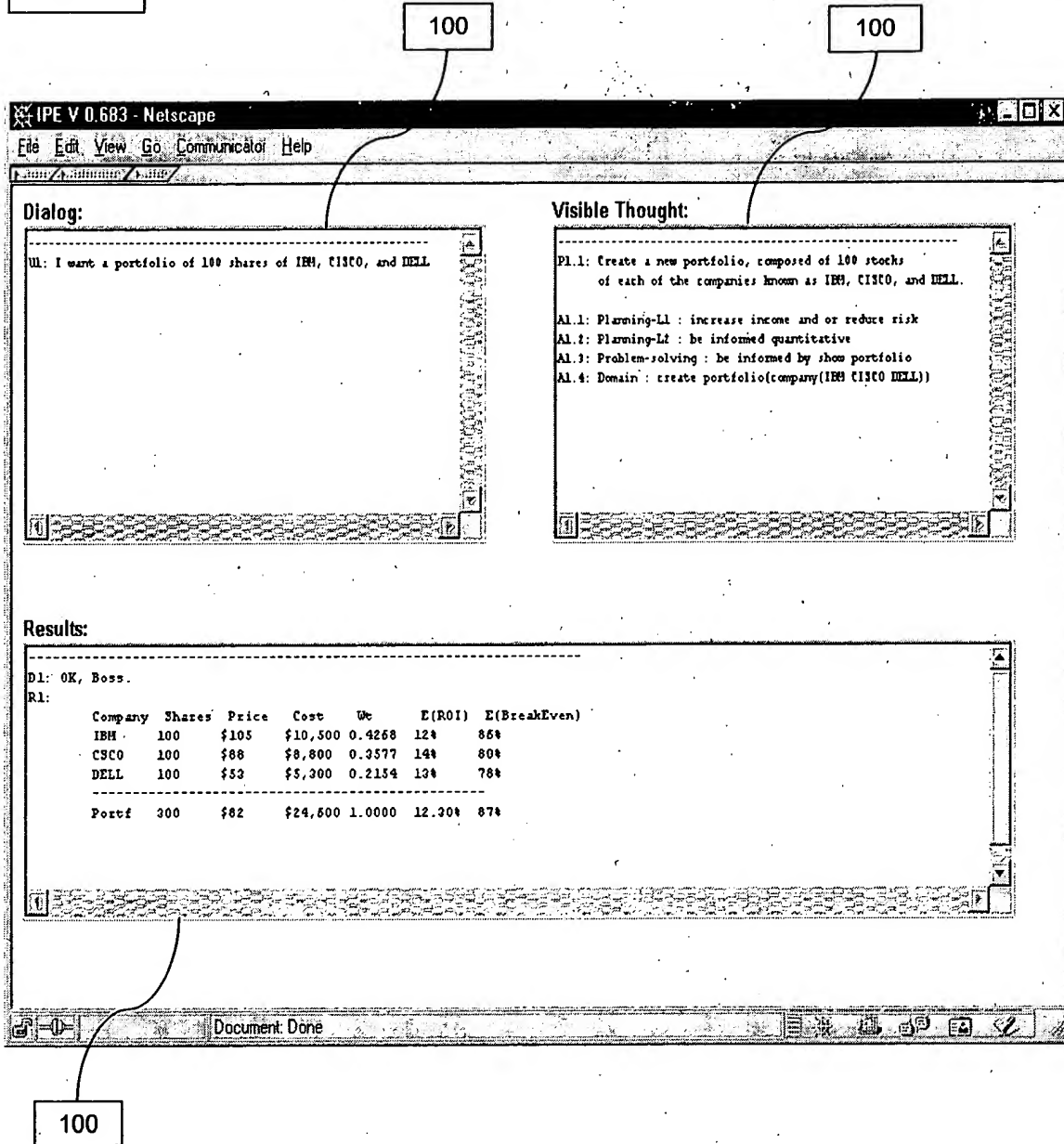
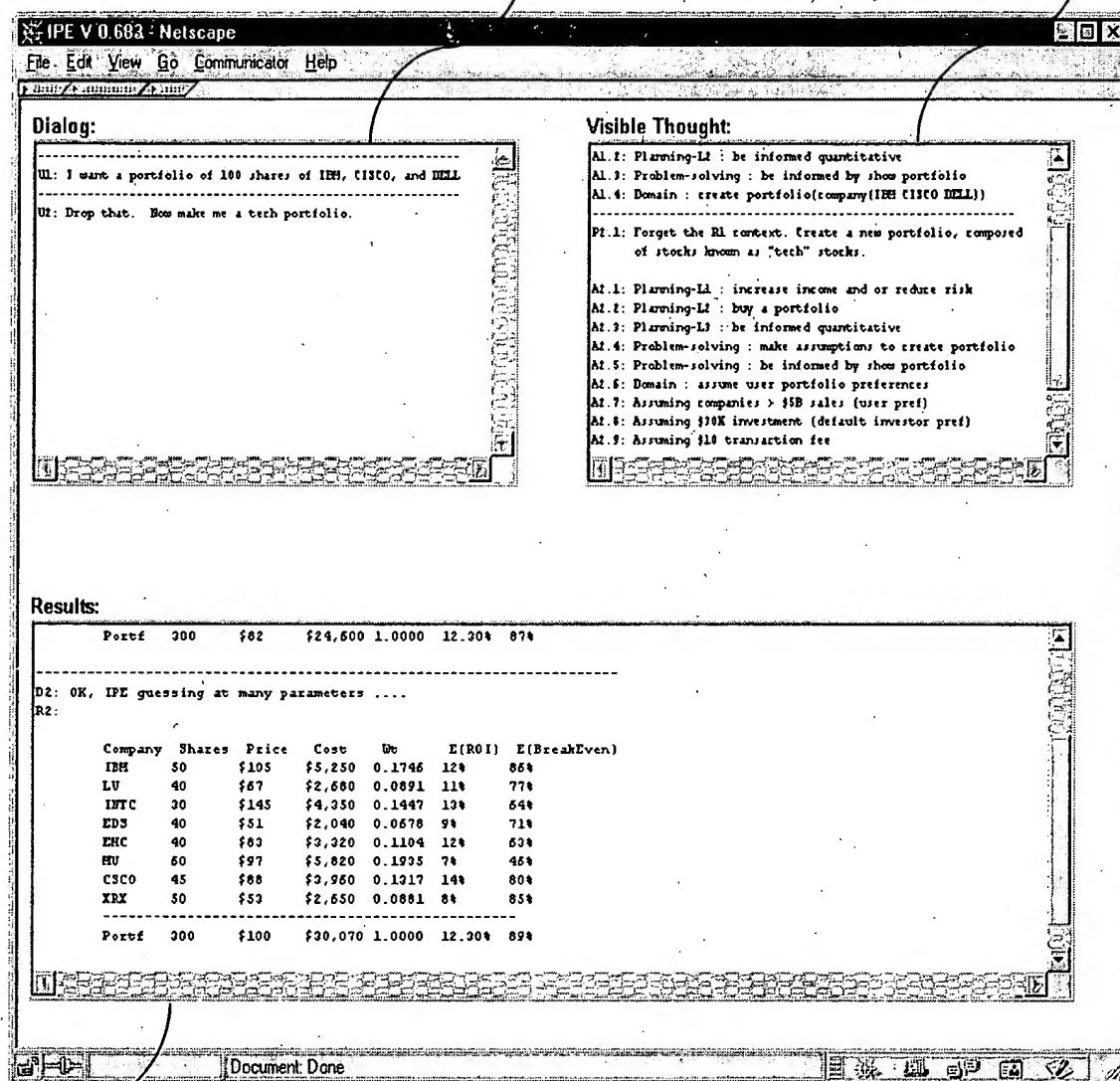


Fig. 11



1102

Fig. 12

1201

1203

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**Dialog:**

U1: I want a portfolio of 100 shares of IBM, CISCO, and DELL

U2: Drop that. Now make me a tech portfolio.

U3: Try it without that.  
(gestures at 2000-07-19.R2.Company=EDS)

**Visible Thought:**

A1.4: Problem-solving : make assumptions to create portfolio  
 A1.5: Problem-solving : be informed by show portfolio  
 A1.6: Domain : assume user portfolio preferences  
 A1.7: Assuming companies > \$5B sales (user pref)  
 A1.8: Assuming \$10K investment (default investor pref)  
 A1.9: Assuming \$10 transaction fee

P1.1: Remove the stock known as EDS from 2000-07-19.R2.

A2.1: Planning-L1 : increase income and or reduce risk  
 A2.2: Planning-L1 : buy a portfolio  
 A2.3: Planning-L1 : be informed quantitative  
 A2.4: (H)-Discourse : cursor on 2000-07-19.R2 indicates "chat"  
 A2.5: UserPreferences : support user dislikes EDS, p = 0.55

**Results:**

INTC	30	\$145	\$4,350	0.1447	13%	64%
EDS	40	\$51	\$2,040	0.0678	9%	71%
EMC	40	\$83	\$3,320	0.1104	12%	63%
HV	60	\$97	\$5,820	0.1935	7%	46%
CSCO	45	\$88	\$3,960	0.1317	14%	80%
XXR	50	\$53	\$2,650	0.0881	8%	65%
Portf	300	\$100	\$30,070	1.0000	12.20%	89%

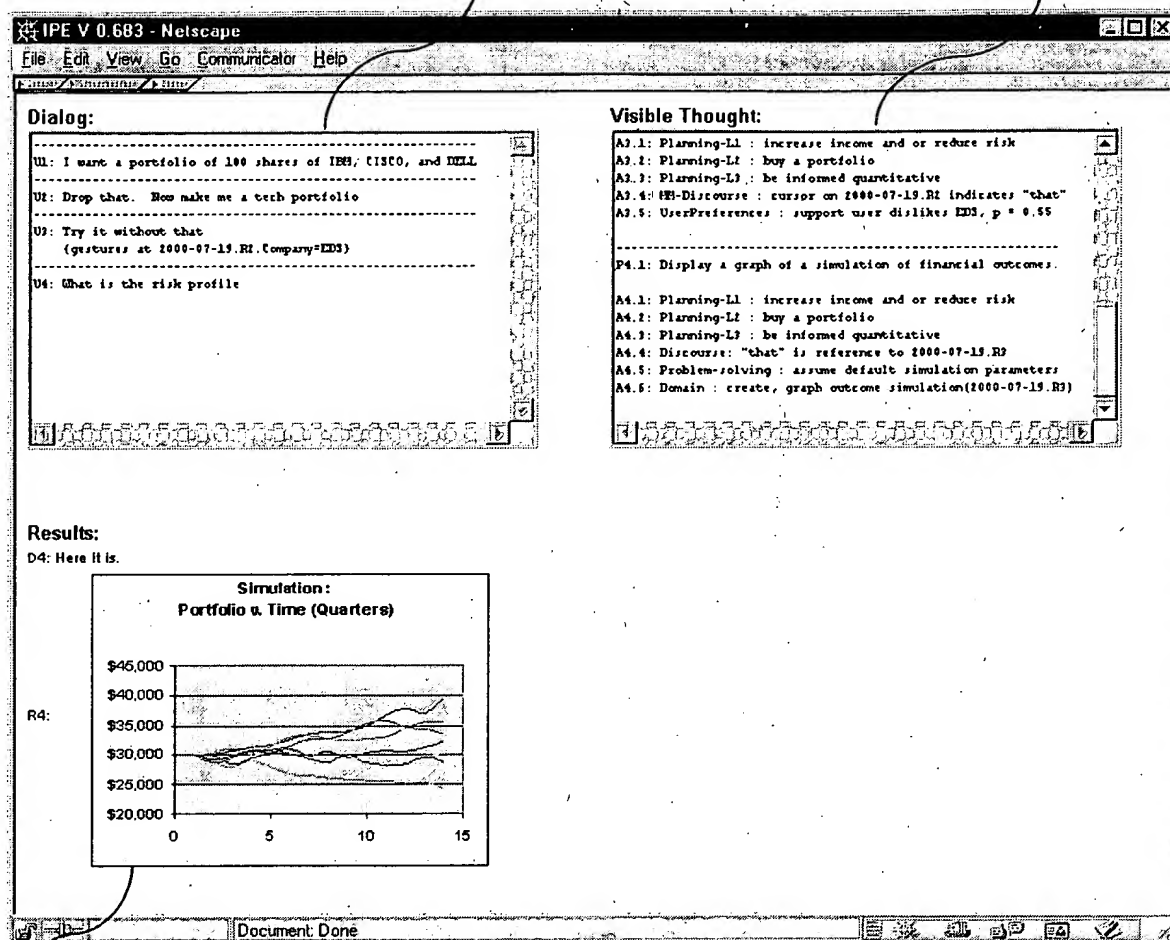
D3: EDS Gone.  
R3:

Company	Shares	Price	Cost	Wt	E(R01)	E(BreakEven)
IBM	50	\$105	\$5,250	0.1673	12%	86%
LU	40	\$67	\$2,680	0.0956	11%	77%
INTC	30	\$145	\$4,350	0.1552	13%	64%
EMC	40	\$83	\$3,320	0.1184	12%	63%

Document: Done

1202

Fig. 13



1301

1303

1302

Fig. 14

1401

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hist.txt - Notepad
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=====
T1: 2000-07-19:23:32:01
=====
U1: I want a portfolio of 100 shares of IBM, CISCO, and DELL
=====

P1.1: Create a new portfolio, composed of 100 stocks
      of each of the companies known as IBM, CISCO, and DELL.
|
A1.1: Planning-L1 : increase income and or reduce risk
A1.2: Planning-L2 : be informed quantitative
A1.3: Problem-solving : be informed by show portfolio
A1.4: Domain : create portfolio(company(IBM CISCO DELL))
=====

D1: OK, Boss.
R1:
      Company Shares  Price    Cost    Wt      E(ROI)  E(BreakEven)
      IBM      100      $105    $10,500  0.4268  12%      86%
      CISCO    100      $88     $8,800   0.3577  14%      80%
      DELL     100      $53     $5,300   0.2154  13%      78%
=====
      Portf     300      $82     $24,600  1.0000  12.30%   87%
=====

T1: 2000-07-19:24:53:20
=====
U2: Drop that. Now make me a tech portfolio.
=====

P2.1: Forget the R1 context. Create a new portfolio, composed
      of stocks known as "tech" stocks.

A2.1: Planning-L1 : increase income and or reduce risk
A2.2: Planning-L2 : buy a portfolio
A2.3: Planning-L3 : be informed quantitative
A2.4: Problem-solving : make assumptions to create portfolio
A2.5: Problem-solving : be informed by show portfolio
A2.6: Domain : assume user portfolio preferences
A2.7: Assuming companies > $5B sales (user pref)

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Fig. 15

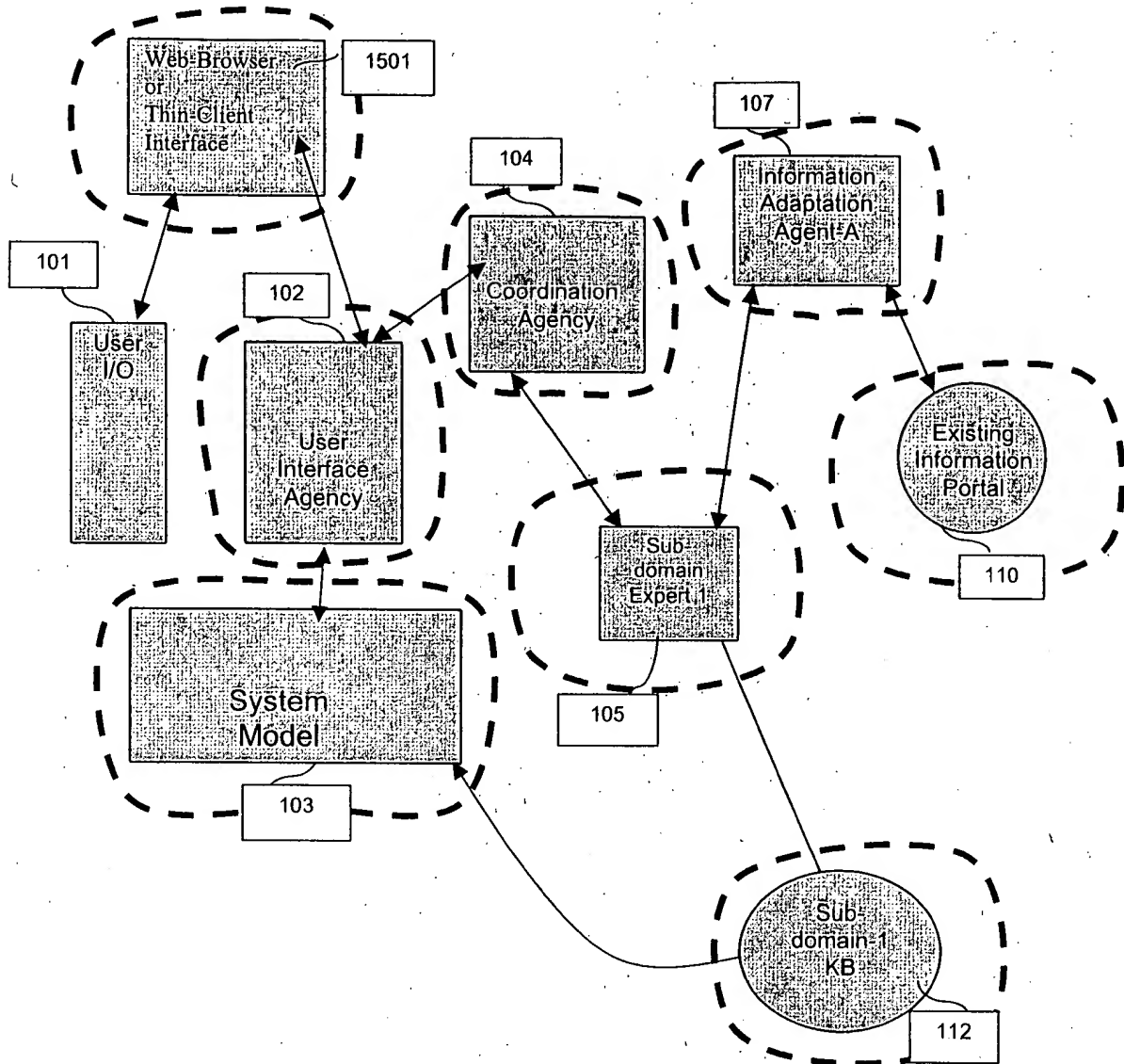


Fig 16

### Simplified Strength/Necessity Belief Calculus

?X = Coffee if:

1601

?X is in a mug (s = .2; n = 0)

?X is a hot liquid (s = .4; n = 0)

?X is brown (s = .6; n = .97)

?X is not tea (s = .3; n = 1)

1602

S = Strength; N = Necessity; B = Belief; D = Disbelief;  
P = Belief measure of premise (input)

#### Belief Evaluation Recurrence Formulae :

$$B_{x+1} = B_x + (1 - B_x) * S_{x+1} * P_{x+1} \quad ; \text{ with } B_0 = 0$$

$$D_{x+1} = D_x + (1 - D_x) * N_{x+1} * (1 - P_{x+1}) \quad ; \text{ with } D_0 = 0$$

$$\text{Conclusion} = B_n * (1 - D_n) ;$$

1603

Example A.  $B_4 = 0.8656$ ,  
given all 4 preconditions known to be true with absolute certainty.

Example B.  $B_4 = 0.7648$ ,  $D_4 = 0.485$ ,  
**Conclusion = 0.393872**,  
given that we are only 50% sure that the liquid is brown , but are  
convinced of all other facts (e.g. because the light is very dim....)

Fig. 17

### Bayesian Belief Calculus -

Bayes's rule states that :

$$p(A | B) = \text{Prob of event A, given event B} \\ = (p(A) * p(B | A)) / p(B)$$

If we know the probabilities  $B_i$  for *every* way that A may be realized, we may write:

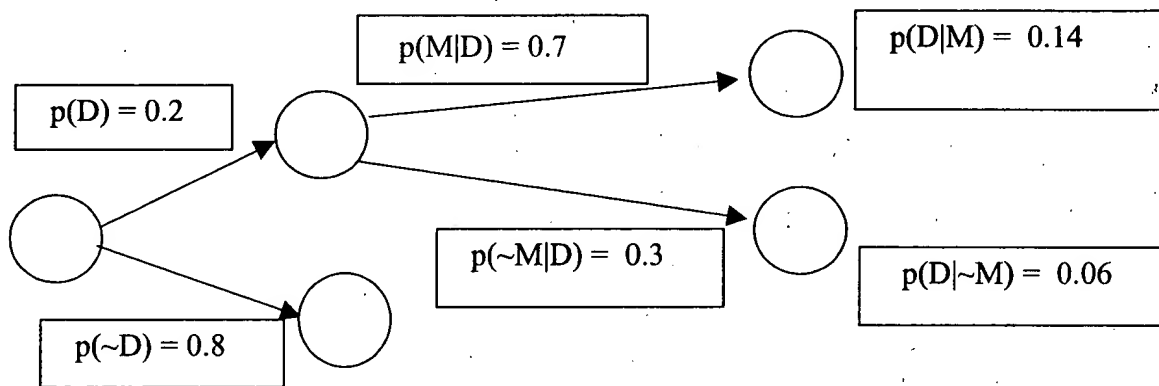
$$p(A) = \sum p(A | B_i) p(B_i)$$

Which allows a straightforward way to compute likelihood, when all possibilities are accounted for.

We can construct networks which relate Bayesian likelihood to various conditions. For example, consider the case where we are given

$p(D) = \text{probability of planning for retirement} = 0.2$ , and  
 $p(M | D) = \text{probability of asking about mutual Funds, given D,} = 0.7$ .

Now we can construct a graph of probabilistic influences that can be inferred:



This mechanism can be used to connect the probabilities of various plans and alternatives, and to infer likely plans from various communications.



Fig. 18

